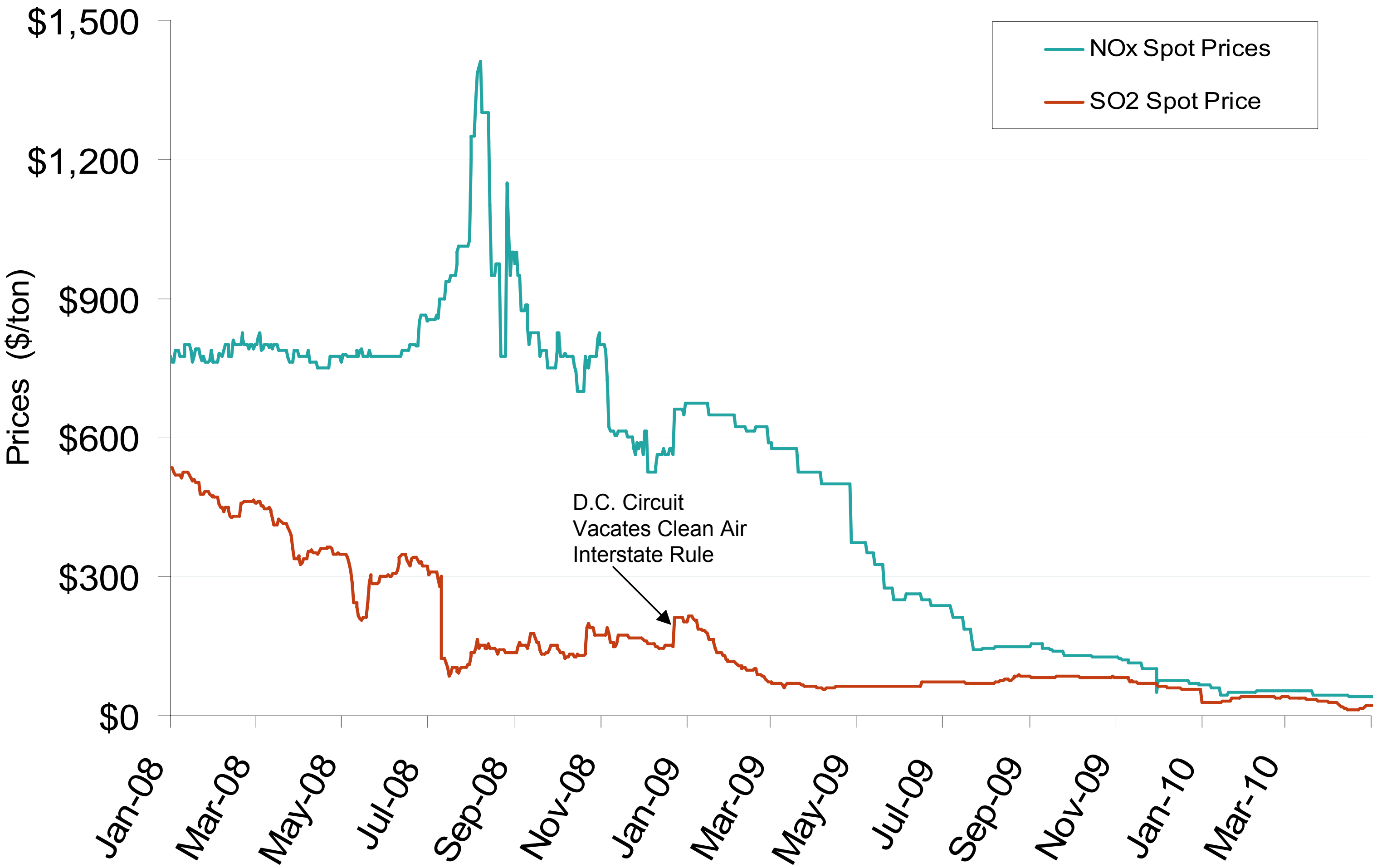
SO_2 Allowance Spot Prices and NOx Seasonal Allowance Spot Prices



Source: Derived from *Bloomberg*.

* Earliest year an allowance may be applied against emissions.

Updated May 7, 2010

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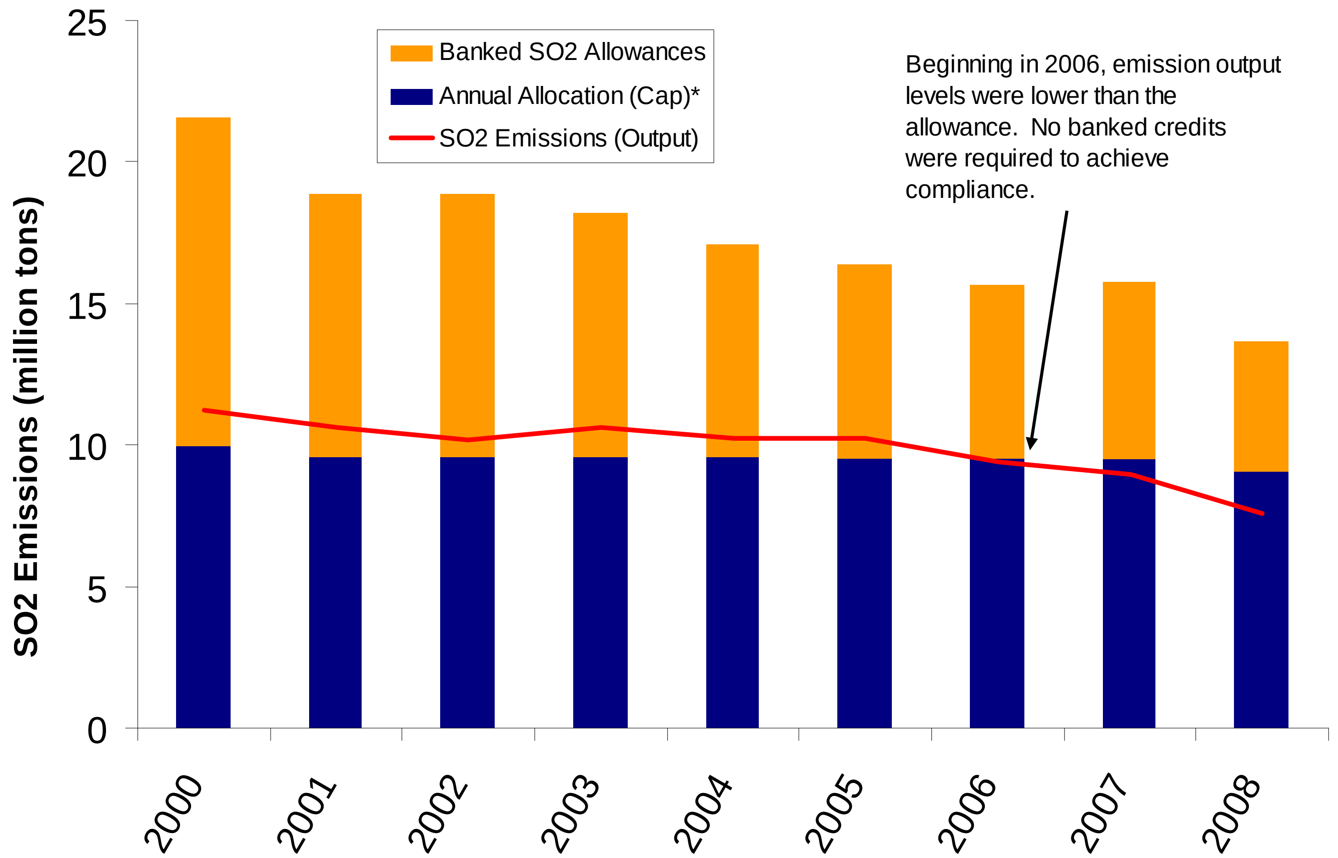
SO2 Allowances Available for Compliance and SO2 Emission Output under Cap-and-Trade



Source: EPA

* See overview on following slide.

Updated August 20, 2009

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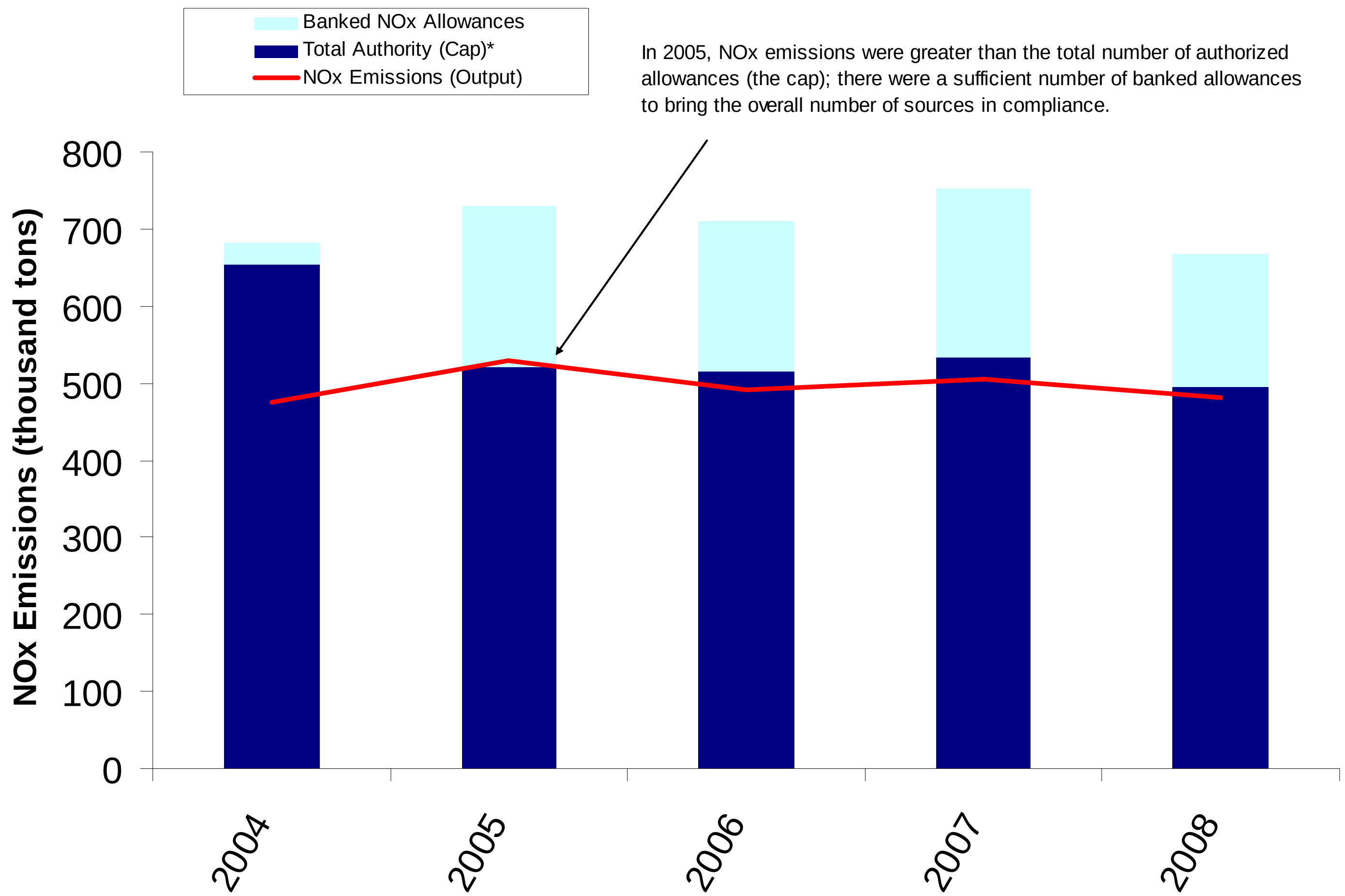
NOx Allowances Available for Compliance and NOx Emission Output under Cap-and-Trade



Source: EPA

* See notes on following slide.

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Brief Overview of the SO2 and NOx Emissions Markets

The electric power industry is a major source of sulfur dioxide emissions (SO2) and nitrogen dioxide emissions (NOx) – both precursors of acid rain and smog. According to the Environmental Protection Agency's (EPA) 2006 Acid Rain Progress Report, the power sector is responsible for 70% of SO2 emissions and 20% of NOx emissions.

Currently US policy encourages reduction in SO2 and NOx emissions which can be achieved through a cap and trade program. This market based model also allows for relative flexibility in compliance options. An emitting source may choose pollution control technology such as add-on controls like flue gas desulfurization (FGD) for SO2 and selective catalytic reduction (SCR) for NOx, fuel switching, and/or participation in the respective cap and trade markets. The decision is primarily driven by the regulatory environment, fuel input type, the level of emission output, and compliance costs, the latter of which affects wholesale and retail prices.

The Acid Rain Program

http://www.epa.gov/airmarkets/progsregs/arp/index.html

EPA's Acid Rain Program (ARP), established under the 1990 Clean Air Act Amendments, requires reductions of SO2 and NOx emissions from the electric power industry. The Acid Rain Program was the first cap and trade program implemented nationwide to reduce SO2 emissions.[1] The SO2 program set a permanent cap on the total amount of SO2 that can be emitted by fossil fuel-fired generating units and allows allowance trading so affected sources have some flexibility in their compliance method. Currently, SO2 sources must surrender one allowance to emit one ton of SO2. If a source falls short on the number of allowances it needs to comply with its individual cap, it can purchase allowances from another source that has a surplus of allowances. An emitting source may have a surplus of allowances for several reasons. For example, if it chose to install and/or run scrubbers, it can "bank" those unused allowances for future use or sell the leftover allowances to other emitting sources.

The NOx Budget Trading Program

http://www.epa.gov/airmarkets/cap-trade/docs/nox.pdf

In 2003, the cap-and-trade method was also implemented to reduce seasonal (primarily summer) NOx emissions from fossil fuel-fired plants. While the EPA administers the program, states are required to share the responsibility for allowance allocation and enforcement. Currently, NOx sources must surrender one allowance to emit one ton of NOx.

[1] The Acid Rain Program also required NOx emission reductions by select coal units but under a rate-based regulatory program [http://www.epa.gov/airmarkets/progsregs/arp/nox.html].

Source – EPA

Collaborative Greenhouse Gas (GHG) Programs

Collaborative Regional GHG Programs:

- Three North American groups with goals to lower regional GHG emissions were initiated by state Governors.
- 32 U.S. states, D.C., eight Canadian provinces, and six Mexican states are Participants or Observers.
- Observer jurisdictions do not commit to group GHG reduction goals, but participate in proceedings should they opt to join later. RGGI Observers are not on its Board.

Western Climate Initiative (WCI):

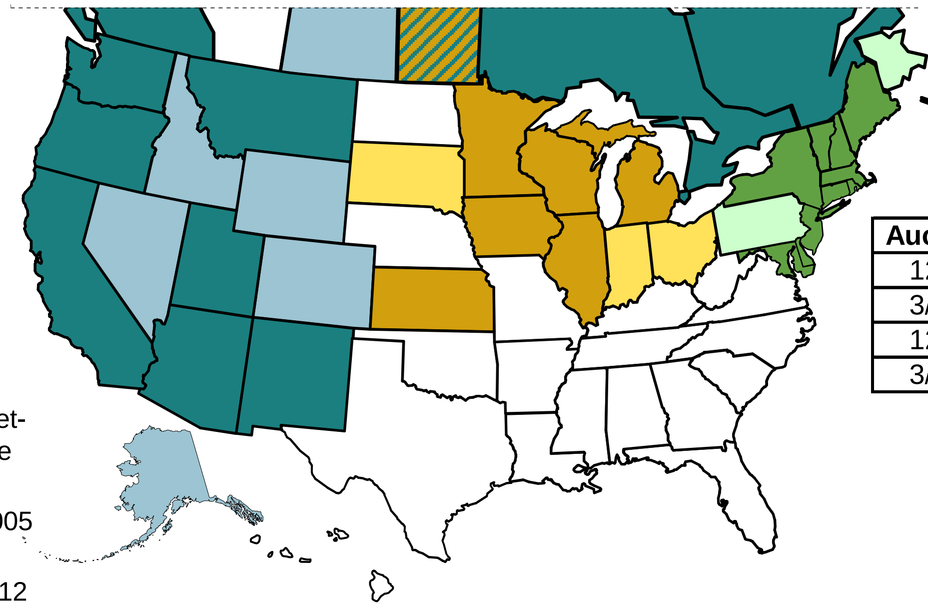
- Created February 2007
- Partners: 7 states, 4 provinces; Observers: 5 states, 1 province
- Announced its design for a market-based, *multi-sector* cap-and-trade program, Sept 2008:
  - 15% CO_2 reduction below 2005 levels by 2020
  - Phase I to take effect Jan 2012

Midwest Greenhouse Gas Reduction Accord:

- Established November 2007
- Participants: 6 states, 1 province; Observers: 3 states, 1 province
- Preliminary design recommendations issued Dec 2008: 15 - 25% reductions by 2020, 60 - 80% by 2050

Regional Greenhouse Gas Initiative (RGGI):

- Compliance period began Jan 1, 2009
- Participants: 10 states
  Observers: 1 state, D.C., 3 provinces
- Market-based cap-and-trade effort to reduce *power-sector* CO_2 emissions.
- 10% CO_2 reduction by 2018 covers over 200 plants
- One allowance is the right to emit 1 ton of CO_2
- Annual RGGI cap is 188 million tons



RGGI Auction Data

Auction Date	Vintage Year	Clearing Price
12/2/2009	2009	$2.05
3/10/2010	2010	$2.07
12/2/2009	2012	$1.86
3/10/2010	2013	$1.86

- Participant in WCI
- Observer to WCI
- Participant in MGGRA
- Observer to MGGRA
- Participant in RGGI
- Observer to RGGI
- Participant in MGGRA & WCI

Updates at: http://www.ferc.gov/market-oversight/mkt-electric/overview/elec-ovr-ghg.pdf

Notes: Kansas is a MGGRA participant and WCI observer. Ontario and Quebec are Partners to WCI and Observers to RGGI; Ontario is also an observer to RGGI.
Sources: regional initiatives - www.rggi.org, www.midwesternaccord.org, www.westernclimateinitiative.org, Point Carbon, analyst reports, trade press

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Collaborative Greenhouse Gas Programs

National Energy and Environment Update:

- Senator Kerry stated that a new Energy and Climate bill will be introduced very soon. Kerry has worked with Senators Lieberman and Graham on the legislation, but Graham recently withdrew his support. The bill is expected to have significant differences from previous Energy and Climate bills including:
  - "Polluter Pays" principle in which oil companies would have to pay a polluter charge. 2/3 of the funds raised would be returned to consumers and 1/3 would support energy efficiency.
  - Incentives for converting heavy-duty fleet vehicles to compressed natural gas and electric vehicle manufacturers
  - Incentives for Modular Nuclear Reactors
- Senator Kerry also stated the bill has support from major industry leaders including AEP, FPL, DePont, and GE

RGGI Auctions:

- Auction 7 conducted on March 10, 2010 raising $88 million for energy efficiency, renewable energy, and other consumer-benefit programs in participating states.
- Participant states are: CT, DE, ME, MD, MA, NH, NJ, NY, RI, VT.
- RGGI has raised almost $590 M to date
- RGGI states auctioned all 28.6 M of the offered allowances for the 2009 vintage and 1.6 of the 2.2 M offered for the 2012 vintage.
- This was the first RGGI auction that failed to sell out.
- 2010 allowances cleared at $2.07 per allowance, up from $2.05 price of Auction 6.
- 2013 allowances again cleared at $1.86 per allowance, the minimum floor price set by RGGI.
- Auction 8 is scheduled for June 9, 2010.

CA referendum seeks to suspend GHG law:

- In 2006, CA passed a law known as AB32, which seeks to reduce greenhouse gas emissions in California and imposes new requirements on power plants, manufacturers and other businesses.
- The "California Jobs Initiative" would delay GHG regulation in CA until the state unemployment rate drops to 5.5% and remains at or below that level for a year
- Signatures for the referendum have been submitted and the measure is expected to qualify for the November Ballot

EIA finds energy-related CO2 emissions down 7%

- EIA reports 2009 energy-related CO2 emissions down 7% or 405 million metric tons.
- EIA attributes the drop to declines in per capita GDP, reduced energy intensity in the economy, and increased use of natural gas and wind generation
- Energy consumption fell 4.8%, led by industrial consumption which dropped 9.9%
- EIA predicts CO2 emissions will rise 1.3% in 2011

Western Climate Initiative (WCI):

- Launched at Western Governors' Association meeting to reduce regional GHG collectively, Feb 2007:
  - Partners: AZ, British Columbia, CA, Manitoba, MT, NM, Ontario, OR, Quebec, UT, WA
  - Observers: AK, CO, ID, KS, NV, Saskatewan, WY
- Initial design released for a market-based, *multi-sector* cap-and-trade program (Sept 2008):
  - Phase I to take effect Jan 2012
  - Phase II to begin 2015; will cover 90% of regional emissions
- Released its 2009 - 2010 Work Plan (Feb 2009), including primary committee tasks.

Abbreviations: CO_2 – Carbon dioxide (emissions); DG - distributed generation; DR - demand response; EE - Energy Efficiency; EPA – U.S. Environmental Protection Agency; GHG - Greenhouse Gases; RECs - Renewable Energy Credits; SF6 – sulfur hexaflouride

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